

REMARKS

PENDING CLAIMS

Claims 20-33 are pending in this application. Claim 20 has been amended. No new matter has been added.

35 U.S.C. § 103

Applicants request reconsideration of the rejection of claims 20-24, 30 and 32 under 35 U.S.C. § 103(a) as being unpatentable over Blonder et al, U.S. Patent No. 4,897,711 in view of Collins et al, U.S. Patent No. 5,852,696; and the rejection of claims 25-29, 31 and 33 under 35 U.S.C. §103(a) as unpatentable over Blonder et al, '711 in view of Hirai et al, 5,481,632.

Blonder is relied upon for disclosing an optical module substantially as claimed. However, Applicants have amended claim 20 to distinguish that which the Applicants regard as the invention. In particular, claim 20 sets forth that the optical device that is connected to the communication processing unit is one selected from a group of a semiconductor conductor optical device and a photo-electric conversion device. Further, the transparent resin that is filled between a face of the optical device that is optically coupled to the optical fiber, and an end of the optical fiber that is optically coupled to the optical device is one selected from a group of a silicone resin and a silicone gel, and is transparent in wavelength band width of the semiconductor optical device and the photo-electric conversion device. Further, claim 20 sets forth that the refractive index of the transparent resin is substantially equal to the refractive index of the optical fiber.

Blonder sets forth an optical device that is optically coupled with an optical fiber using silicone, as set forth in column 7, lines 1-3. However, Blonder does not disclose using a silicone resin or silicone gel that is transparent in wavelength band width of the semiconductor optical device and the photo-electric conversion device and further that has a refractive index that is substantially equal to a refractive index of the optical fiber, as claimed in claim 20.

Collins is relied upon for disclosing an optical electronic device coupled to a communication processing unit. However, Collins is deficient in disclosing the transparent resin claimed by Applicants in amended claim 20. As amended, claims 20-24, 30 and 32 are patentable over the combination of Blonder and Collins.

With respect to claims 25-29, 31 and 33, Blonder is relied upon as the primary reference and Hirai is relied upon as the secondary reference. Blonder does not disclose the transparent resin that is a silicone resin, as set forth in claim 25. Further, claim 26 sets forth that the refractive index of the transparent resin matches that of the optical fiber and the transparent resin is set forth as being in gel form in claim 27.

In Hirai, the optical waveguide substrate 3 is formed of an Si crystal and as a material of the substrate, for example, ZnO, LiNbO₃, chalcogenide or the like can be used in addition to the Si crystal. See column, 13 lines 20-24 of Hirai. Hirai employs a dielectric optical waveguide like ZnO, LiNbO₃ and chalcogenide, and an optical fiber. Also, it employs not only silicone resin, but also an acrylate resin (column 8, lines 16-20) and epoxy resin (column 9, lines 66-67) as a resin for matching the refractive indexes of the dielectric optical

waveguide and the optical fiber. However, Hirai's dielectric optical waveguide has no active regions such as a semiconductor optical element.

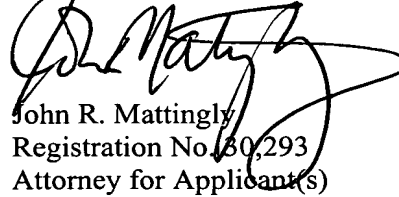
Further, in Hirai, the resin has a refractive index substantially equal to that of the optical waveguide and the optical fiber in order to reduce a coupling loss. See column 14, lines 4-9 of Hirai, which states: "This resin is used to achieve refractive index matching between the optical waveguide and the optical fiber 10 and normally has a refractive index substantially equal to those of the optical waveguide and the optical fiber". Therefore, the refractive index of the resin, which is used in between the optical waveguide and the optical fiber, is determined by the refractive indexes of the optical waveguide and the optical fiber, without further consideration.

On the other hand, in the present invention, there is a difference in a refractive index between an active optical device, for example a semiconductor optical device, and an optical fiber. That is, a refractive index of an optical fiber is about 1.4, but that of a semiconductor optical device is higher than that of the optical fiber. Accordingly, the cited references fail to disclose a silicone resin used in between the optical waveguide and the optical fiber which has a refractive index matching that of the optical fiber, as claimed in claim 26. See page 41, lines 17-25 of the present specification, which states that the refractive index of the transparent resin is 1.4, which generally matches that of the optical fiber. Accordingly, the combination of Blonder and Hirai does not render the invention set forth in claims 25-29, 31 and 33 unpatentable under 35 U.S.C. §103(a). Therefore, the rejection should be withdrawn.

CONCLUSION

In view of the foregoing amendments and remarks, reconsideration and reexamination are respectfully requested.

Respectfully submitted,



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